

Reflections on the lecture: outmoded medium or instrument of inspiration?

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The traditional, didactic lecture is under attack from diverse quarters. With its origins rooted in the emergence of orality, the lecture now stands as only one of a plethora of educational communication tools, and has been subject to criticism particularly by constructivists for failing to deliver deep and effective learning experiences. This article explores the lecture's advantages and limitations in the context of evolving teaching practices and technologies, and posits that the strength of the lecture lies in its immediacy and presence. Its future survival and evolution must exploit this powerful asset to enhance student learning through engagement and interaction.

Introduction

The challenges for effective teaching of the biosciences are proliferating in several dimensions. In one direction there is the rapid growth in complexity and diversity of the discipline itself; and in another, there is the emerging confusion of pedagogic theories which are competing for the attention of educators in general. When these are tied to the expansion of technological resources for delivering the learning experience, there is little surprise that university bioscience teachers are uncertain of the best ways forward and cling to so-called tried-and-trusted traditional techniques. One such technique is the didactic lecture, still the cornerstone, heart or mainstay (choose your cliché) of most undergraduate science courses in spite of the growing application of problem-based learning and group discussion approaches (Camp, 1996; Ramsden, 2003, p. 147; Hodgson, 2005). The question explored here is the survival of the lecture in the face of evidence of its apparently severe limitations as a teaching tool. The approach to this issue will be substantially generic, but will also touch on ways in which the lecture might be enhanced to serve bioscience teaching and on some prospects for educational practices which can best engage the hearts and minds of future bioscientists—the students who learn as a result of these practices.

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Origin and evolution of the lecture

As a point of entry, the following definition of the lecture provided by Hart *et al.* (2000) may be of help:

If we think about teaching as a spectrum of techniques, at the one end we may have the pure Socratic method where the teacher only asks questions, and only the students give answers. At the other end of the spectrum, we have the straight lecture with no active or verbal participation by students at all. Within the spectrum, we have various other forms of modified lectures, tutorials and seminars. It is the extreme end of the spectrum, the straight lecture with no active student verbal participation at all, that we are discussing here. (Hart *et al.*, 2000)

The origins of the lecture as a public discourse are rooted deeply in the emergence of human orality. The study of human language and its evolution is a field riven by controversy (Hauser *et al.*, 2002; Crow, 2005; Pinker & Jackendoff, 2005), but there are strong arguments supporting the idea that group communication by speech was central to the survival and success of early hominid societies (Allott, 2001; Pinker & Jackendoff, 2005). Such survival depended on the effective replication, transmission and organization of information about food sources, environmental dangers, animal behaviour, and human relationships which are likely to have been amongst the prominent concerns of the earliest speakers. The leap from these life-crucial discourses to the pedagogic lecture appears huge, but there remains a clear thread of connection: the reproduction in the minds of those *without* knowledge or experience of the information present in the minds of those *with* it. Oral communication of this information, through rituals, poetry or story-telling, is likely to have been a major force for conceptual transmission for tens of thousands of years of early human existence.

Education emerged from this thread of orality in the Western world most notably in Ancient Greece (Cubberley, 2005). Oral poems such as those of Homer and Hesiod formed a repository of memory that 'represented at once history, education and entertainment for the audience' (Gibson, n.d.). However, the development of alphabetic writing and literacy from the eighth century BC marked a transition away from the oral tradition towards a scribal focus of education and cultural organization (Gibson, n.d.; Cubberley, 2005). Plato deplored the rise of the 'unintelligent' written word at the expense of the spoken (Plato, trans. Jowett, 1999), even though he himself wrote widely. This irony extended further: for while writing and reading represented a theoretical freeing of the student from the direct communication of the oral lecture, it provided a model of the mind as a tabula rasa. This concept, first expounded by Aristotle (350 BC, trans. Smith, 1930), reinforced the didactic mode of instruction: the students gained knowledge by close attention to the words of the masters, and by copying and inscribing those words both literally on their scraped tablets and metaphorically in their minds.

The concept of the tabula rasa survived through the centuries of theologically-centred learning in monasteries and cathedral schools to the rise of the medieval universities, and was philosophically re-energized in the thirteenth century by Thomas Aquinas and again in the seventeenth by John Locke (Cubberley, 2005).

While liberating through the implication that individuals were born equal (Pinker, 2002), this concept sustained an educational paradigm in which the student is a passive recipient of dissected information (Cubberley, 2005, ch. IX). Although partly offset by opportunities for disputation—logical debates popular until the sixteenth century—it seems clear that for more than half a millennium, the essential characteristics of the lecture were didactic in the purest sense of the word. The scarcity of books would have abetted this tradition of instruction until the second great advance in Western communication: the development of the printing press in the 1440s. With this, there must have been a genuine liberation from the lecture, enabling the students' independent advancement of learning through reading of texts in the absence of the master. The growth of the printed and now electronic text is self-evident: its global pervasiveness is almost complete.

Given this intense textualization of knowledge and the freeing of students from the need to attend the master's voice, the medieval model of the lecture has survived remarkably well (Brent, 2005). How has this persistence of orality come about, and what are the strengths and weaknesses of this particular medium as a pedagogical tool?

Critiques of the lecture

Criticisms of the lecture as an instrument of teaching and learning are not new, as evidenced by Dr Samuel Johnson's assertion (Osgood, 1917) that:

People have now a-days...got a strange opinion that every thing should be taught by lectures. Now, I cannot see that lectures can do so much good as reading the books from which the lectures are taken....Lectures were once useful, but now, when all can read, and books are so numerous, lectures are unnecessary. (Osgood, 1917, pp. 62, 195)

Nevertheless, some properties of the didactic lecture have evidently favoured its preservation: it is quantitatively efficient and flexible, in that an audience of 5 to 500 or more students can be presented with the same material simultaneously; it affords the lecturer substantial control over the content and delivery of the material; and according to some research it is as effective as other teaching methods in transmitting information (Bligh, 1972, cited in Hodgson, 2005; Bligh, 1998, cited in Nicholls, 2002). The lecture may also be popular with both teachers and students who favour a non-participatory approach to learning (Ellington & Earl, 1996). However, these factors alone do not seem sufficient sustenance for the lecture in the face of current opposition to this teaching mode. Before turning to the other advantageous qualities that may reside less explicitly in the lecture format, let us examine briefly the changes in the educational cultural climate that might lead to the lecture's demise.

Hart *et al.* (2000) identify four main groups of arguments against the lecture method. As they indicate, the least effective are those which point to student boredom and inattention: such criticisms apply to *bad* lecturing, and any teaching method can be poorly done. The more potent arguments relate to the possible

redundancy of the lecture in a time when multiple media are available for education; the tendency of the lecture to produce surface rather than deep learning; and the lecture's inability to allow or compensate for differences in the ways in which students actually learn. The last two points of potential weakness have been exposed by the development of theories of learning which are centred on two tenets: that effective learning is best achieved when it is actively constructed by the learner through experience, both individually and socially; and that such constructions may occur through a diversity of styles of learning which reflect the psychological biases of the individual learners (Kolb, 1981; Biggs, 1989, cited in Ramsden, 2003; Ohio State University, 1992; Nicholls, 2002, pp. 77ff). As the constructivist Carol Twigg (1999) put it:

Because the lecture method is largely a one-way technology, it is impossible to employ a variety of sound pedagogical techniques. Most lecture courses are notoriously ineffective in engaging students. The traditional format neither encourages active participation nor offers students an opportunity to learn collaboratively from one another. (Twigg, 1999, p. 14)

Further, Joel Foreman (2003) has suggested that in large lectures there are far too many students who are 'uninterested pragmatists' cramming and then forgetting the material being taught. Even from the perspective of the lecturers themselves, the function of the lecture is often regarded as mainly an information delivery tool, as a survey by Sutherland and Badger (2004) has shown. In such contexts, then, the lecture may be 'good for teaching, but not for learning'; and certainly not for *deep* learning, in ways which lead to changes in students' conceptions and interpretations of the world (Biggs, 1999, cited in Nicholls, 2002). Space does not permit review of the multidimensional aspects of learning and the theories that have evolved to explain the psychology of the process and propound ways of promoting effective learning; some overviews are provided by others (Ohio State University, 1992, ch. 2; Mergel, 1998; Ramsden, 2003). What is clear at least is that the behaviourist theories of the first half of the last century, rooted as they were in the doctrine of the blank slate (Pinker, 2002), have given way to robustly argued constructivist theories which themselves draw on traditions of learning by experience formulated in the educational philosophies of Rousseau and Pestalozzi (Cubberley, 2005). The zone of intersection between the didactic lecture and constructivism is not a comfortable one. One of the fiercest criticisms of didactic teaching comes from the philosopher and educator Paulo Freire, in whose view the teacher 'expounds on a topic completely alien to the existential experience of the students. His task is to "fill" the students with the contents of his narration—contents which are detached from reality...' (Freire, 1970). In Freirean pedagogy, what is needed instead is a liberating education based on 'acts of cognition, not transferrals of information'; students in dialogue with the teachers, and the educational goal of 'posing of the problems of human beings in their relations with the world'.

If these theoretical attacks were not enough, extensive evidence accumulated since the 1960s from studies of student learning in lectures versus that effected by active teaching strategies indicates that it is the *active* involvement in learning that leads to

the development of higher-order thinking skills and deep learning (see e.g. Prince, 2004, for review). Clearly these latter outcomes are more concordant with the claimed aims of university education than the ability to rote-learn scientific formulae or list the properties of the cell, for example; and indeed amongst the expectations listed in the benchmark statement for the biosciences (Quality Assurance Agency for Education, n.d.), the ability to recognize and apply subject-specific theories, paradigms, concepts or principles and to synthesize and evaluate bioscience information are the sorts of skills that accord with the higher-order levels of thinking as defined in Bloom's hierarchical taxonomy (Nicholls, 2002, p. 65). The lecture would appear on these grounds to be poorly suited to the task; it would probably be best deployed for introducing a course or for making general announcements to students.

These attacks and evidence of weakness should surely have left the lecture—the predominant university teaching mode in most disciplines and especially in the sciences (70–90% of professors use the lecture as their primary teaching strategy (Gardiner, 2000))—dead in the water. How then to explain its stubborn survival? Inertia—or perhaps active fear of change—has undoubtedly contributed to a retentive philosophy on the part of university faculties (Benvenuto, 2002), together with the perceived cost-efficiencies of the lecture (though the costs to learning may be hidden (Foreman, 2003)). But there are other factors, more important but perhaps less appreciated, that have imbued the lecture with its remarkable durability, and an exposure of these may be illuminating.

Support for the lecture in an age of change

In spite of the increasing pervasiveness of constructivist educational theories, and the growing awareness amongst educators of the need for pedagogical reform focusing on student-centred, active and experiential learning (Camp, 1996; Prince, 2004), students themselves may—perhaps surprisingly—be a force for conservatism. A study by Alfred Carlson on the efficacy of, and student response to, a problem-based learning (PBL) strategy versus lecture or alternative active learning strategies found no evidence of significant difference for most measures of performance at four different Bloom's levels (Carlson, 2005). Notably, however, the PBL approach led to a negative student response, the lowest ratings by them and comments that they were not learning anything. Conversely, the traditional lecture-based approach received far higher ratings both for the professor's performance and as an overall learning experience, and left the professor himself disheartened as to the prospects for PBL. While PBL techniques evidently have great potential (Camp, 1996; Woods *et al.*, 2000), factors such as the exposure to embarrassment that students face in PBL sessions and the need for highly supportive learning environments must be considered by educators proposing active learning strategies (Benvenuto, 2002).

Further evidence for the enduring significance of lectures comes from the studies of Vivien Hodgson (2005), who has noted that lectures can stimulate 'experiences of relevance' in the minds of the students. These experiences can be *extrinsic*,

prompted, for example, by thoughts of assessment; or *intrinsic*, where the student is thinking more about the meaning and implications of what the lecturer is saying. Intrinsic experiences in particular can promote deep learning; and there is one further mode, ‘vicarious experience of relevance’, in which the student empathizes with the enthusiasm of the lecturer and in turn finds their interest kindled in the subject. Such studies accord with notions of the importance of lecturer enthusiasm and lecturer–student rapport as central to promoting student learning (Hodgson, 2005, and references therein).

Beyond these important aspects there is one final salient characteristic: the lecture as *performance art* (Brent, 2005). While it is unquestionable that lectures can be dull or confusing, there can also be exciting, uplifting, even inspirational lectures which linger in the memory and stimulate the students to further enquiry and learning. Further, even without achieving these stratospheric heights, the lecture carries with it a certain atmosphere. The students are present as a diverse group of individuals who nevertheless are sharing a common experience; who are drawn together as a ‘community of learners’; and whose attention—even if transiently—is focused on a performer. As suggested by Hart *et al.* (2000), ‘The lecturer is creating an image for the group. This image exists in the minds of the group and represents a new landscape through which the group has been led by the lecturer’. This live experience cannot be replicated through texts or recorded media; the immediacy, the corporality and the subtle dialogue between students and lecturer are irreproducible and ephemeral. Indeed, the information flow is far from one-way: an astute lecturer will read the cues coming from the students and adjust pace, delivery, emphasis and even content in response to signals of puzzlement or loss of interest (Hart *et al.*, 2000). In parallel, the students will sense the cues from the lecturer, forming a meta-cognitive exchange which is imbued with and can enhance meaning and understanding.

In this view, then, it is first the *possibility* of experiencing an engaging or inspirational lecture which is a motivation for maintaining this method—much as with live music performances, for example: not all are good, but some are intensely and positively memorable. At some unstated, unconscious level, students may be seeking just this sort of experience. The second element is embodied in the event itself: the act of *being there*. Recall the Platonic view that speech is ‘graced by the category of presence’ (Luco, 1999): such physical presence, the engagement with a unique performance rooted in the oral tradition, and interactions in real time and space can be more powerfully affecting than is commonly acknowledged, and are not found in other, less performative modes of teaching (Brent, 2005). Put another way, the lecture *is* an experiential learning tool; it is just not obviously a constructivist one.

The future of the lecture

In spite of the symbolic and pragmatic potency of the lecture, and the likelihood of its continuing largely unchanged for some time yet, it seems probable that an adaptive survival strategy will feature in university teaching in general and in

biosciences education in particular as we move further into the third millennium. There are two final threads to trace.

The first relates to clear evidence that active participation is a prerequisite for students' construction of meaningful knowledge (Prince, 2004). The lecture format at its most didactic cannot address this pedagogic need and must be made more valuable for student learning by enhancements prompted by current learning theories. The biosciences present challenges for educators which prominently include rapidly emerging technologies, an 'exponential increase' in information, merging of the disciplines of biology, physics, chemistry and mathematics, and ethical issues impacting medicine and agriculture amongst others (Bell, 2001). The enhancements of the lecture to facilitate learning and understanding of this complex field must include the opportunity for greater dialogue and space for student reflection. Information is now so readily accessible through an extraordinary range of contact points that the lecture should function more as a guide to than a précis of course material, pointing students in the right direction to explore and build their own understandings. Strategies such as interactive windows, peer instruction, and educational games within lectures are amongst an extensive range of tools for increasing dialogue and enhancing learning (Seeler *et al.*, 1994; Jones, 2002; Lodish & Rodriguez, 2004; Allen & Tanner, 2005; Gülpinar & Yeğen, 2005; Lujan & DiCarlo, 2006). Additionally, lectures do not of course operate in isolation from the rest of the curriculum, and thus there is a need for involvement of students with the biosciences at many levels and using diverse teaching strategies, including exposure to the scientific method (both practical and theoretical), debates about ethical issues, and the formation of support structures which enable students to engage meta-cognitively with the teaching process itself (Bell, 2001). In this way, the lecture, in conjunction with other teaching approaches, may be opened to a wider access of diverse student learning strategies and strengths. In turn, this can foster an engagement with the scientific and ethical issues, which is fundamental for the development both of the learners themselves and of the biosciences as a discipline.

The second and final thread relates to the deployment of advancing technologies and the possibilities of simulated presence. While, as indicated by Brent (2005), live performance is in essence an unbreachable experience of human contact, the evolving potential of virtual environments to provide remarkably immersive experiences which can be controlled, interactive and available to large numbers in both synchronous and asynchronous (time-shifted) frames cannot be ignored (Foreman, 2003). Given students' increasing participation in gaming environments, multi-user online worlds, and other forms of virtual community, the potential for these media to be employed for pedagogic ends is striking. Thus, the experience of learning could in the future be enriched by taking the students in to virtual worlds where the scientific issues can be explored—experiments carried out; molecules interacted with and visualized; virtual patients treated; and virtual debates engaged with.

In conclusion, what seems to emerge from this analysis is that effective education at heart must proceed from *engagement*. While this is a complex term itself (Krause,

2005), it seems clear that the cognitive frames and experiences of the learners can only be engaged if we as educators recognize the need for empathy and emotional connection in disciplines superficially as impassive and dispassionate as molecular biology. Balancing the serious content of the curriculum with the appeal to the desires of the students for excitement, motivation and inspiration is a way forward that can make use of live lecture, group discussion, or virtual environment, as well as deeply engaging combinations of these. We are at a threshold of educational potential which parallels, but may greatly exceed, that of the revolutionary rise of the medieval universities. Tradition and transformation through technology can fruitfully coexist, if we have the will to allow them to do so.

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